



communications technologies, including FCC licensed radio spectrum, to support the safe and efficient delivery of energy services to their customers. Southern has significant interest in ensuring that broadband or other communications networks used to support “Smart Grid” and other utility-related communications requirements are reliable and secure. Southern therefore appreciates the opportunity to address the questions raised by the Commission in the *Notice of Inquiry*.

Southern agrees with the Commission that advances in technological innovation have the potential to allow licensees to more efficiently utilize spectrum. However, while dynamic spectrum access technology has great potential, the FCC must ensure that any frequency bands selected are chosen wisely and the technology includes sufficient safeguards to avoid interference before it is authorized widely. Southern also believes that electric utilities and other licensees that utilize FCC licensed radio spectrum for critical public safety operations would benefit greatly by receiving more information in this docket on the opportunities presented by cognitive radios. Southern looks forward to reviewing the comments and reply comments submitted by other parties in this proceeding that would provide a greater understanding of how such technologies can support its communications requirements.

#### **I. The Current State of Dynamic Spectrum Access Technologies**

As Southern explained previously in the FCC’s National Broadband Plan proceeding, utilities and other critical infrastructure industries rely heavily on wireless communications in order to ensure the safety, reliability, and efficiency of essential public services on which all Americans depend.<sup>2</sup> In addition to fulfilling vital public safety needs and critical infrastructure industry (“CII”) needs, non-commercial spectrum applications – such as private land mobile

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<sup>2</sup> Comments of Southern Company Services, Inc., GN Docket No. 09-51 (filed June 8, 2009); Reply Comments of Southern Company Services, Inc. (filed July 21, 2009).

radio and microwave systems – support a number of industries and operations that are a significant part of our country’s economic and public well-being, such as energy exploration and transportation.

Southern is obligated to its employees and to the general public to conduct its operations in a safe manner and to maintain the reliability of its electric and gas utility services. Southern relies heavily on its private communications systems to support its utility operations and must maintain as reliable a communications network as possible in order to effectively manage its utility assets. Southern’s private internal voice and data communications systems support mission-critical functions, such as supervisory control and data acquisition (“SCADA”) systems that are used to remotely monitor and control key components of the interconnected electric transmission grid and electric distribution systems. Southern holds a variety of FCC licenses used to support its operations, including licenses in the private land mobile radio service and the fixed microwave services, including multiple address systems (“MAS”).

The feasibility of opening up certain spectrum bands for shared use on an opportunistic or dynamic basis depends entirely on the ability of “smart radio” or other cognitive radio technologies to actually detect and avoid other, higher-priority services and the enforceability of interference protections. The FCC has only recently begun to adopt rules designed to implement dynamic spectrum use for unlicensed devices and licensed services in certain frequency bands, such as the 3650-3700 MHz band for licensed wireless broadband use and unlicensed radio transmitters in the TV White Spaces. Accordingly, the use of dynamic access spectrum technologies remains in its infancy and the use of these technologies is still being explored to determine where they may be deployed without compromising the viability of existing services. The FCC should wait to see how dynamic spectrum use unfolds in these bands before it

determines whether and how these technologies can be used on other bands relied upon by public safety and CII entities. In Southern's experience, very few companies are currently in the process of developing cognitive or opportunistic radio technologies to support utility and CII operations.

The fact that utilities have such demanding requirements for their communications systems means that utility and CII operations have little or no margin for any potential interference, interruption, or diminution in their critical communications services. Therefore, bands used by public safety, utilities, and other CII entities – which support communications systems that must be instantaneously available twenty-four hours a day, seven days a week, 365 days a year at a standard of reliability of 99.999 percent – should not be considered for shared or opportunistic use at least until sufficient experience has been obtained to prove with absolute certainty that opportunistic use of these bands (i) would not interfere, and (ii) would be terminated immediately upon a need to access this spectrum for public safety or critical infrastructure applications.

The FCC should proceed with caution in considering new potential technologies, such as spectrum sensing and other dynamic spectrum sharing technologies, in bands that are used for utility and other CII applications. Various frequency bands in which utilities operate have certain characteristics that do not lend themselves to spectrum sharing. For example, Southern's Smart Meter program is based on the Sensus FlexNet Advanced Metering Infrastructure network, which uses advanced technology that allows for a range of features, including meter reading for monthly billing, two-way communication between customers and the company, outage detection, and remote reconnects and disconnects.<sup>3</sup> Southern's metering program relies

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<sup>3</sup> See Southern Company Reaches Milestone in Smart Meter Program with 1 Million Installations, News Release (March 5, 2009) (available at [http://www.southerncompany.com/news/iframe\\_pressroom.aspx](http://www.southerncompany.com/news/iframe_pressroom.aspx)).

upon narrowband Personal Communications System (“PCS”) frequencies in the 901-902 MHz, 930-931 MHz, and 940-941 MHz bands. Spectrum sensing would not be a viable option for these bands because the system is constantly reading meters remotely and communicating with a range of end-user devices to provide new data to the customer. Unlike the “white spaces” that exist in the TV bands – where spectrum is not being used by licensed services – the meters do not “unkey” so there are no white spaces in the narrowband PCS spectrum on which another transmitter could operate. Communications systems that are continuously keyed up for continuous transmission are not viable candidates for spectrum sensing technology.

In a previous proceeding regarding a proposed “interference temperature” metric to quantify and manage interference as a means of encouraging more efficient use of spectrum, electric utilities expressed grave concerns about the impact that the concept could have on system reliability and safety.<sup>4</sup> The FCC ultimately terminated that proceeding in 2007, noting that commenting parties “generally argued that the interference temperature approach is not a workable concept and would result in increased interference in the frequency bands where it would be used.”<sup>5</sup> Similarly, the FCC should take into account the criticality of the communications network when considering the use of dynamic access technologies in certain spectrum bands. Spectrum bands used by utilities are less suited for sharing with wireless broadband services regardless of any technical or operational conditions that may be imposed on wireless broadband providers.

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<sup>4</sup> Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, *Notice of Inquiry and Notice of Proposed Rulemaking*, ET Docket No. 03-237, 18 FCC Rcd 25309 (2003) (Comments and Reply Comments of PacifiCorp, Comments and Reply Comments of Xcel Energy Services, Inc., Comments of Idaho Power, Comments and Reply Comments of United Telecom Council).

<sup>5</sup> Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, *Order*, ET Docket No. 03-237, 22 FCC Rcd 8938 ¶ 2 (2007).

As discussed above, the FCC adopted rules in November 2008 to allow unlicensed radio transmitters to operate in the broadcast television spectrum at locations where that spectrum is not being used by licensed services – commonly referred to as “white space.”<sup>6</sup> To prevent interference, the FCC decided that TV band devices must include a geo-location capability combined with the capability to access to a database of existing spectrum use to determine if a channel is available. Just recently, on January 26, 2011, the FCC issued an Order designating certain entities to act as TV band device database administrators responsible for implementation and management of the databases.<sup>7</sup> The FCC acknowledged that “the development and implementation of a well functioning system for employing white spaces devices will require significant database oversight and testing.”<sup>8</sup> The FCC has suggested that unlicensed broadband wireless devices in the TV White Spaces could be used to support electric utility Smart Grid applications, as well as public Wi-Fi hot spots, broadband access to schools in rural areas, and real-time streaming of video for home networks. Southern recommends that the FCC evaluate how TV white space devices operate under real-world conditions in order to inform how dynamic spectrum access can be utilized in other frequency bands that are relied upon for critical operations and where spectrum use may be more dynamic. Southern believes that the FCC can and should gain valuable experience from the use of TV white space devices before cognitive radios are more widely deployed in other frequency bands where there are a wider variety of licensees or technologies.

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<sup>6</sup> Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186; and Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, ET Docket No. 02-380; *Second Report and Order and Memorandum Opinion and Order*, 23 FCC Rcd 16807 (2008); *Second Memorandum Opinion and Order*, FCC 10-174 (rel. Sept. 23, 2010).

<sup>7</sup> Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186; and Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, ET Docket No. 02-380; *Order*, DA 11-131 (rel. Jan. 26, 2011).

<sup>8</sup> *Id.* at ¶ 9.

## **II. The FCC Can Promote Innovation By Allowing Incumbents Greater Flexibility to Operate Their Systems**

In the *Notice of Inquiry*, the FCC requested comment on ways in which it can help promote the development of dynamic spectrum access technologies for use on both a licensed and unlicensed basis. As a user of FCC licensed radio spectrum in the private land mobile radio service and the fixed microwave services, Southern believes that the FCC can promote innovation by providing greater flexibility to licensees to operate their systems, subject to general rules that licensees (1) do not transmit outside of their licensed frequency band; (2) do not cause harmful interference to other licensees; and (3) achieve the requisite spectral efficiency.

The FCC should further explore allowing licensees to use their licensed channels for a variety of transmissions, including voice and data. For example, the FCC should allow licensees that operate part 90 frequencies in the Private Land Mobile Radio Service bands at 150-174 MHz and 450-470 MHz to use their channels for both voice and data operations, so long as the licensee stays within the authorized channel bandwidth, complies with the FCC's spectral efficiency requirements, and is able to effectively avoid interference to other users. Pursuant to Section 90.403(e), licensees on shared channels in the Private Land Mobile Radio Services must take reasonable precautions to avoid causing harmful interference, such as by monitoring the transmitting frequency for communications in progress.<sup>9</sup> Cognitive radios, if properly deployed, could potentially allow a licensee flexibility to use the same channel for voice, data, or any other type of communication without causing harmful interference to other licensees operating in the same band.

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<sup>9</sup> 47. C.F.R. § 90.403(e).

One example of how more efficient use of the spectrum can be made through more sophisticated channel monitoring is the 150-174 and 450-512 MHz band used for private land mobile radio services, where the FCC has adopting monitoring requirements for non-exempt trunking systems.<sup>10</sup> A “trunked radio system” is a radio system employing technology that provides the ability to search two or more available channels and automatically assign a user an open channel.<sup>11</sup> Trunked radio systems operating on private land mobile radio channels between 150-512 MHz must employ equipment that prevents transmission on a trunked frequency if a signal from another system is present on that frequency.<sup>12</sup> Centralized trunked radio systems are exempt from the monitoring requirement under certain circumstances, such as where the license has exclusive use of the channel pair in the local area. For trunked radio systems that are not exempt from the monitoring requirement, the repeater (base station) must monitor the input channel for transmit signals coming from co-channel mobile and portable units.<sup>13</sup> The corresponding repeater output channel will be disabled during the co-channel mobile or portable unit’s transmission. In some cases, due to topology, geography, congestion levels, or non-standard pairs or unpaired frequencies, additional monitoring requirements are imposed. In particular, the repeater (base station) must also monitor the output channel for transmit signals coming from co-channel base stations and the corresponding repeater output channel is disabled during the co-channel base station’s transmission. This could potentially serve as a model for allowing more efficient use of licensed spectrum if the level and type of monitoring is sufficient to guard against disruption to co-channel licensees.

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<sup>10</sup> 47 C.F.R. § 90.187.

<sup>11</sup> 47 C.F.R. § 90.7

<sup>12</sup> 47 C.F.R. § 90.187(b).

<sup>13</sup> Private Land Mobile Radio – Monitoring Levels for Non-Exempt Trunked Systems on Channels Between 150-512 MHz. *Public Notice*, DA 01-2852 (rel. Dec. 7, 2001).

The FCC can also promote the use of dynamic spectrum access technologies by encouraging existing licensees to experiment with such technologies in their existing, exclusively-licensed spectrum. The FCC should make clear how its existing rules governing private land mobile systems and other systems relied upon by public safety and CII entities permit licensees wide latitude to adopt and implement dynamic spectrum management techniques to manage access to and use of their exclusively-licensed spectrum. By supporting efforts by licensees to incorporate dynamic spectrum access technologies into their existing licensed systems, the FCC will help further define the capabilities of these technologies. CII and public safety entities would benefit greatly by learning more about how other licensees use these technologies.

Southern anticipates that cognitive radios and other dynamic spectrum access technologies could be useful for both fixed and mobile operations. Initially, Southern believes there will be more applications for fixed use because it will be easier for a fixed system to adapt to the radiofrequency environment.

### **III. The FCC Can Improve the Spectrum Dashboard By Populating It With More Useful Data**

The Commission seeks comment on the Spectrum Dashboard, an online tool designed to provide information on how spectrum is being used, who owns licenses for the relevant spectrum and what spectrum is available. In particular, the FCC requests comment on how the information presented in the Spectrum Dashboard could be made more useful in promoting more efficient use of the spectrum. Southern recommends that the FCC focus on improving the Spectrum Dashboard by populating it with more data that might be useful to utilities and other CII entities. At present, the Spectrum Dashboard Availability Map primarily displays very

limited information about commercial bands, such as 700 MHz, the Advanced Wireless Service (“AWS”), the Broadband Personal Communications Service (“PCS”), the Broadband Radio Service (“BRS”), and the Wireless Communications Service (“WCS”). It would be helpful if the FCC could make more information available to utilities and other non-commercial entities that are interested in acquiring spectrum to support private, internal communications systems. The FCC should also improve the search functions of the Spectrum Dashboard so that the licensees can search by licensee name and browse the map to find information regarding spectrum in the private land mobile radio services and other services utilized by CII entities.

However, for the Spectrum Dashboard to be truly valuable to licensees, it would need to be accessible by fixed and personal portable devices to identify unused channels that are available at their geographic locations. As discussed above, the FCC mandated that TV band devices have the capability to access to a database of existing spectrum use to determine if a channel is available. In theory, the FCC’s Spectrum Dashboard has potential to provide licensees in other frequency bands with a similar method of determining available spectrum. However, the FCC must still conduct significant testing and oversight of the TV band database before it can be made generally available for use by TV band devices. The FCC should wait until it is able to evaluate the results of that testing and real-world operations in the TV White Spaces before it could study the potential of the Spectrum Dashboard to be used in conjunction with other radio devices.

At the same time, the FCC must ensure that information it collects and makes publicly available on spectrum use and availability takes into account the critical nature of spectrum used to support utility operations and how such private systems are different from commercial systems. As Southern discussed in its comments on the National Broadband Plan, CII and public

safety spectrum must be instantaneously available at any time to handle large amounts of traffic, such as during or following major outages or emergencies.<sup>14</sup> Commercial Mobile Radio Services (“CMRS”) systems are designed differently from private land mobile systems, which are designed to allow for one-to-many “dispatcher-to-crew” communications (where a single dispatcher sends a communication to multiple mobile units) and “talk around,” which allows mobile units to communicate directly with each other without the need to route the communication through the network or a repeater. Because of the technical and operational differences between CMRS and private land mobile systems, the FCC must take care that any type of map purporting to depict spectrum availability or other information about spectrum usage that is included in the Spectrum Dashboard makes clear that spectrum utilization cannot be measured the same way for bands used for commercial services and bands used for private land mobile systems or other systems relied upon by public safety and CII. Any determination regarding spectrum utilization or availability for CII and public safety spectrum must be based on peak usage levels during times of emergency and not on any estimates of average or continuous usage levels.

#### **IV. Secondary Markets Offer Limited Potential to Utilities for Dynamic Spectrum Access Techniques**

The FCC also seeks comment on whether specific aspects of its secondary market mechanisms should be revised to encourage and promote licensees to enter into dynamic spectrum leasing arrangements, such as private commons. As discussed above, utilities and other CII entities rely heavily on wireless communications in order to ensure the safety, reliability, and efficiency of essential public safety services. Utilities must be able to access their

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<sup>14</sup> Southern Comments at 9-12, GN Docket No. 09-51.

spectrum instantaneously at any time to handle large amounts of traffic, such as during or following major outages or emergencies. Accordingly, Southern believes that dynamic spectrum leasing arrangements with third-party commercial carriers, perhaps with cognitive radios, offers only a very limited potential for utilities and CII entities to use commercial spectrum for critical utility and public safety operations. At most, Southern envisions that, even if commercial carriers were willing to allow access to their spectrum through the secondary markets, it would be limited to very low priority communications, comparable to what could be placed on commercial networks themselves. Utilities need access to spectrum on which they can rely for critical command-and-control functions that cannot be made secondary or subject to preemption.

## **V. CONCLUSION**

Southern supports the Commission's efforts to evaluate the current state of dynamic spectrum access technologies and to promote the development of such technologies. However, Southern urges the FCC to proceed with caution in selecting the frequency bands that are opened up to new licensing models and to make sure that any new technologies include sufficient safeguards to avoid interference to critical utility and public safety operations.

Respectfully submitted,

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